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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/763,356	01/23/2004	Won-Jun Lee	9898-314	7097

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EXAMINER

ALANKO, ANITA KAREN

ART UNIT	PAPER NUMBER
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1765

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/763,356

Applicant(s)

LEE ET AL.

Examiner

Anita K. Alanko

Art Unit

1765

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 2/27/07 amdt.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,2,7-10 and 42-49 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 43-46 and 48 is/are allowed.
- 6) ☒ Claim(s) 1,2,7-10,42, 47 and 49 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

Election/Restrictions

The restriction requirement of new claims 43-46 has been reconsidered and is withdrawn.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1-2, 7-10, 42, 47 and 49 are rejected under 35 U.S.C. 103(a) as being unpatentable over Huang et al (US 5,668,038) in view of Kim et al (US 6,383,867 B1).

Huang discloses an etching method comprising:

providing a wafer 10 having a dielectric layer 16 and an electrode 18 partially protruding from a top surface of the dielectric layer (Fig.4, the portion of layer 18 that is above layer 16 is “partially protruding” from it, as broadly interpreted);

etching the dielectric layer with a chemical solution (Fig.6, col.4, line 66-col.5, line 4);
and

prior to etching the dielectric layer, reducing the protruding portion of the electrode (Fig.5, col.4, lines 15-18, 25 “polysilicon etch stage”), wherein reducing the protruding portion includes recessing a top surface of the electrode below the top surface of the dielectric layer (as shown in Fig.5 and Fig.8A, and since polysilicon is etched selectively to oxide, col.4, lines 55-58, with a ratio of 0.9:1.0).

Huang fails to disclose how deep the polysilicon is etched relative to the top surface of dielectric 16, thus Huang fails to disclose etching to a depth of at least 500 Å. However, the recitation of 500 Å is a relative thickness, which has no useful meaning since the thickness of the insulating layer is not cited. In Huang, the final polysilicon thickness is important since it determines the final properties of the capacitor. Therefore, the cited range would have been obvious to one with ordinary skill in the art depending on the relative thicknesses of the layers and their function in the final product, since they appear to reflect a result-effective variable which can be optimized. See MPEP 2144.05 IIB.

As to amended claim 1, Huang discloses in the figures only one electrode. However it is obvious to form several electrodes since many devices are formed on one wafer. For example, Kim teaches that it is useful to form at least two electrodes (Fig.1A-1C). It would have been obvious to one with ordinary skill in the art to form a plurality of electrodes as taught by Kim in the method of Huang because it is saves time and money to produce more than one at the same time rather than to form them one-by-one.

As to amended claim 1, Huang discloses in the figures only one electrode. However it is obvious to form several electrodes since many devices are formed on one wafer. For example, Kim teaches that it is useful to form at least two electrodes (Fig.1A-1C). It would have been obvious to one with ordinary skill in the art to form a plurality of electrodes as taught by Kim in the method of Huang because it is saves time and money to produce more than one at the same time rather than to form them one-by-one.

As to claim 2, since the method of modified Huang is the same as the instant invention, it is expected to have the same results of preventing bubbles from adhering to the electrode.

As to claims 7-10, Huang discloses to use dry etching with CF₄ (col.4, line 32) or wet etching with a polysilicon etchant (col.5, lines 1-4) to reduce the protrusions.

As to claim 42, Huang discloses that the dielectric layer 16 includes an oxide (col.3, lines 32-34).

Allowable Subject Matter

Claim 43-46 and 48 are allowed.

The following is an examiner's statement of reasons for allowance: the prior art fails to teach or suggest an etching method comprising:

providing a wafer having a dielectric layer and an electrode including sidewalls having inner and outer surfaces, wherein a portion of the sidewalls partially protrude from a top surface of the dielectric layer such that the inner and outer surfaces of the protruding portion of the sidewalls are exposed;

etching the dielectric layer with a chemical solution; and

prior to etching the dielectric layer, reducing the protruding portion of the electrode, wherein reducing the protruding portion includes recessing a top surface of the electrode below the top surface of the dielectric layer, as in the context of claim 48.

The closest prior art, Huang et al, has a protruding portion, however there is no motivation to provide the protrusion such that the inner and outer sidewalls of the protruding portion are exposed, as in the context of claim 48. There is no motivation to also expose both inner and outer sidewalls in Huang because the polysilicon layer 18 is a blanket layer.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Response to Amendment

The claims are rejected over Huang and Huang in view of Kim. Kim is newly cited to teach forming a plurality of electrodes, as in amended claim 1.

Response to Arguments

Applicant's arguments with respect to the claims have been considered but are moot in view of the new ground(s) of rejection, which includes Kim to teach the plurality of electrodes.

Claim 43 is allowed since Huang does not disclose that the upper portion of the sidewall portion of the electrode protrudes above top surfaces of both the first and second dielectric layers. Huang only teaches to protrude above the first, but not the second dielectric. Claim 48 is

allowed since Huang does not teach or suggest to expose both inner and outer sidewalls (as in instant invention Fig.1E), as discussed above. Note claim 49 cites “complaner” instead of - - coplanar - - .

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Anita K. Alanko whose telephone number is 571-272-1458. The examiner can normally be reached on Mon-Fri until 2:30 pm (Wed until 11:30).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on 571-272-1465. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 1765

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Anita K. Alanko

Anita K Alanko
Primary Examiner
Art Unit 1765